Census of Black Hole Accretion

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Black hole and stellar growth in galaxies

$M_{BH} - \sigma$ relation

- Black hole and stellar growth are related in the context of galaxy evolution
- X-rays reveal black hole growth phase directly
- AGN feedback $\longrightarrow$ downsizing
- Goals: census and demographics of black holes
- Approaches: target well-studied fields and bright objects (not searching for the unknown)

Physical properties of interest

physical properties

- L/L_{edd}
- $\dot{M}$
- M_{BH}

Con-X will yield:

luminosity (with bolometric correction)

accretion rate (if assume efficiency)

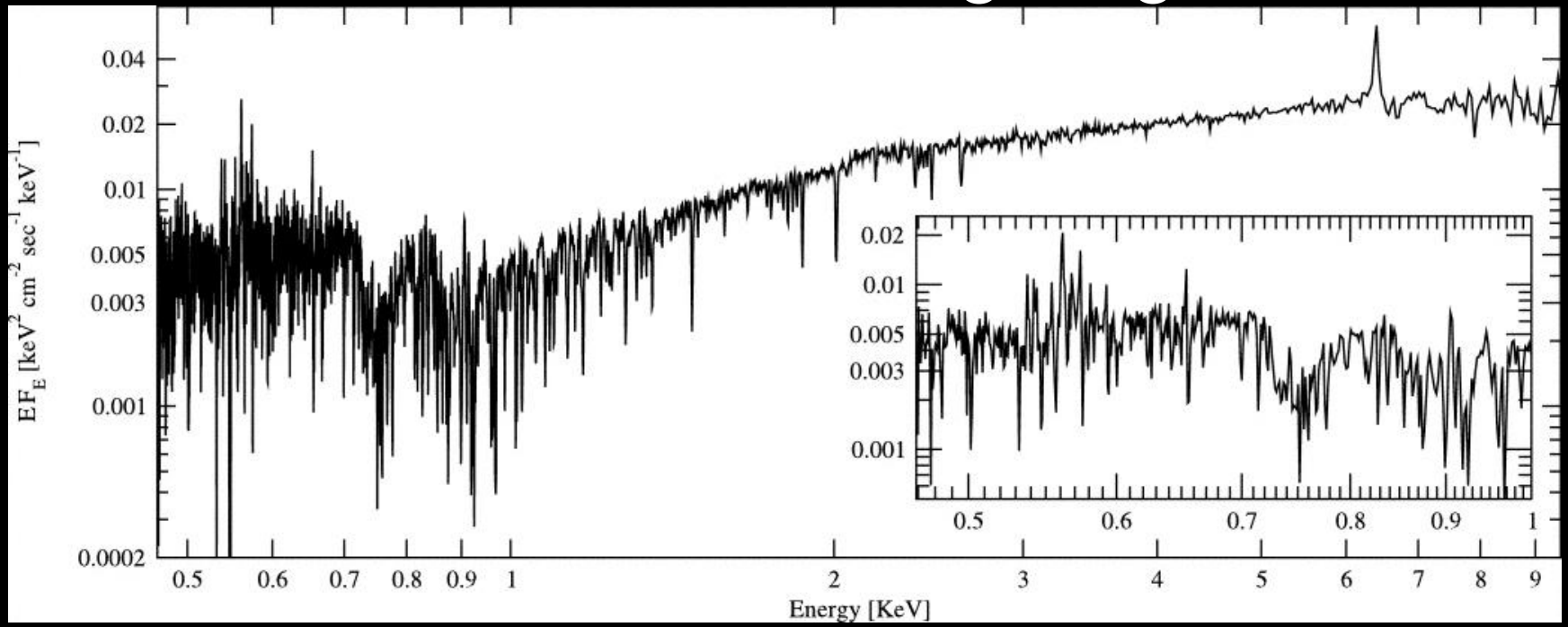
other mass estimators are available

X-rays may also directly reveal L/L_{edd} (or test this!)

(Brandt et al. 1997; Shemmer et al. 2006)

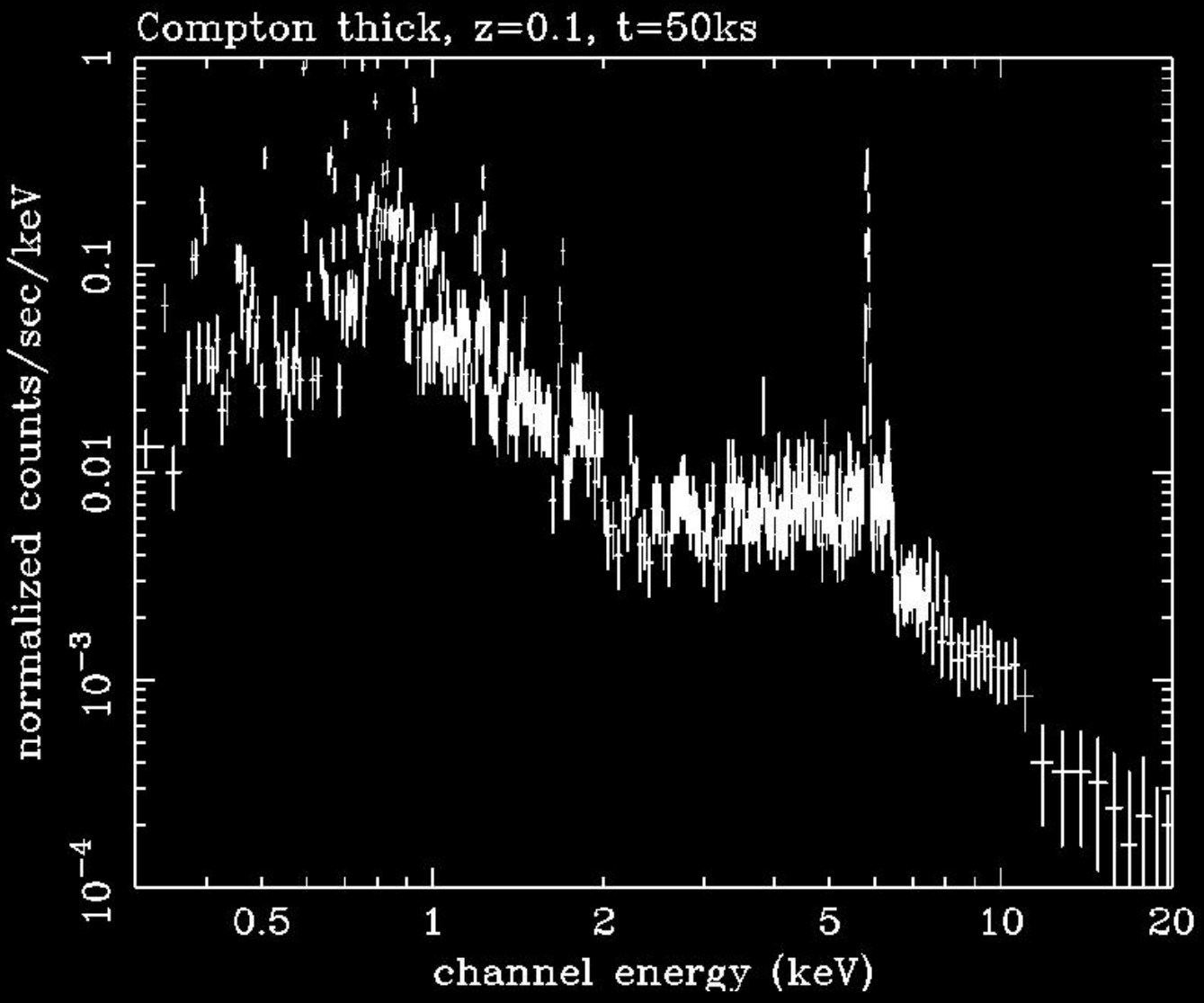
Spectral complexity

NGC 3783 observed with Chandra gratings



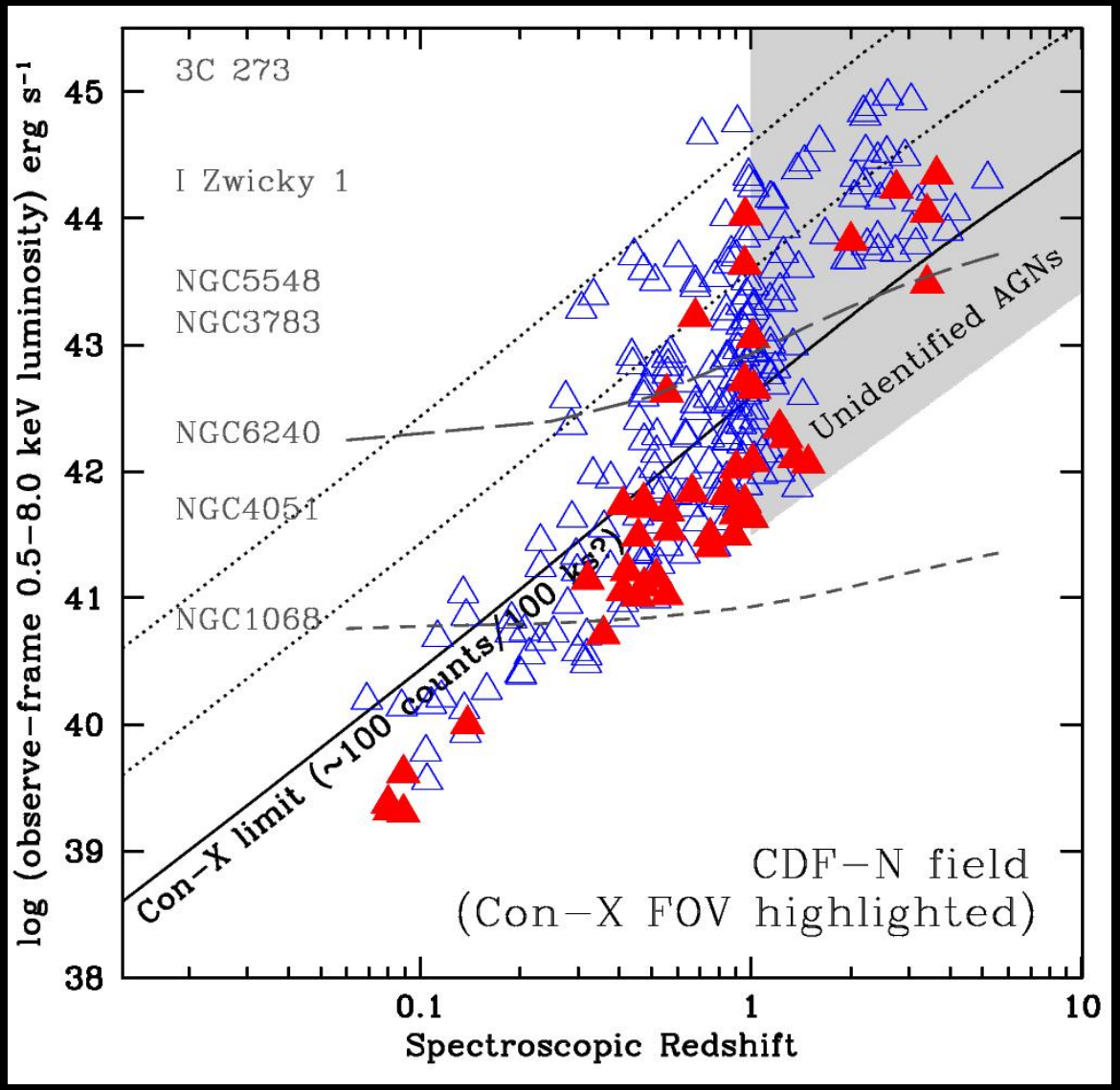
(Kaspi et al. 2002)

Spectral complexity



Soft X-ray emission can masquerade as unobscured AGN

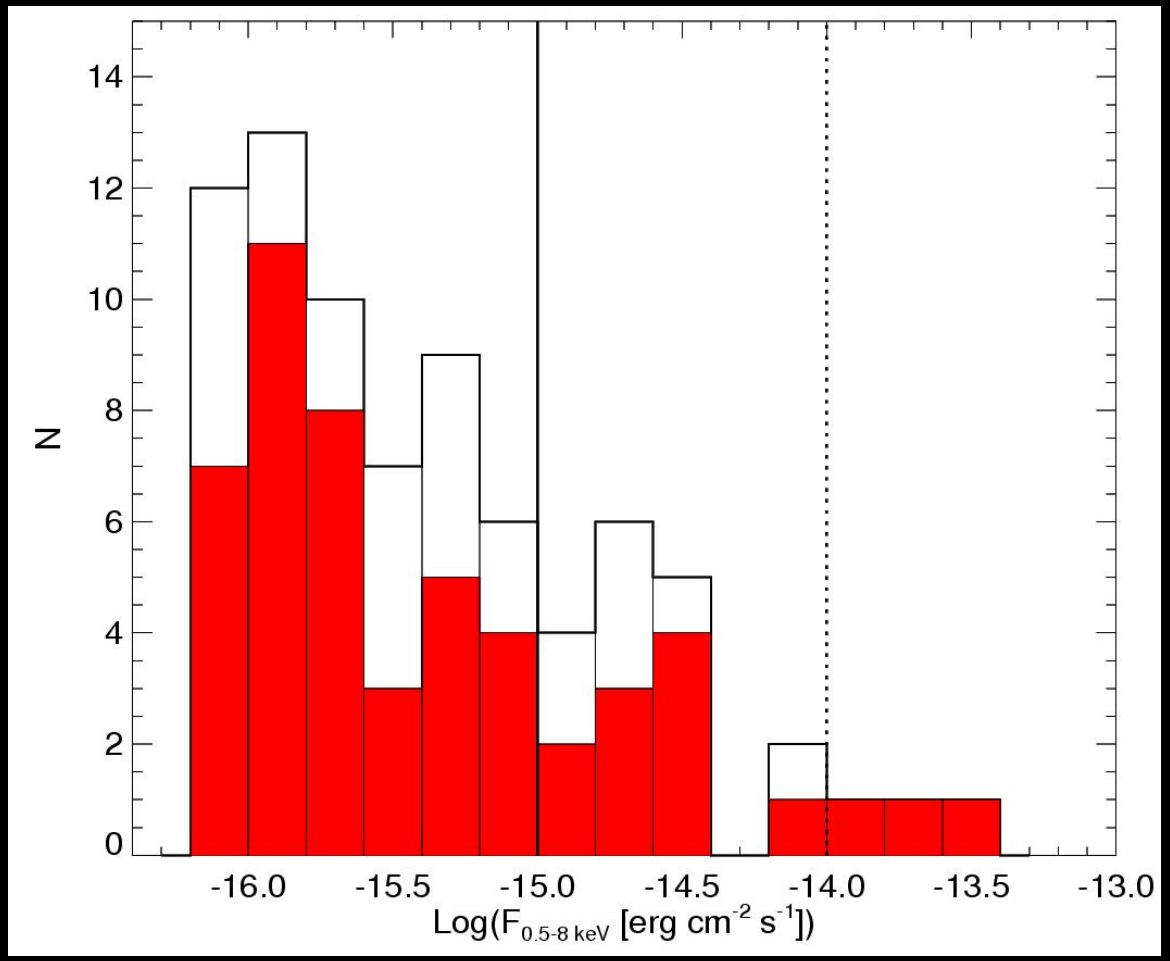
Feasibility



sources with optical spectra
(D. Alexander)

known deep fields
X-rays to identify "unknown sources"
feasibility of obscured AGN at z∼0.1
feasibility of bright AGN at z∼2

Feasibility



sources with optical spectra
(F. Bauer)

known deep fields
X-rays to identify "unknown sources"
feasibility of obscured AGN at z$\sim$0.1
feasibility of bright AGN at z$\sim$2

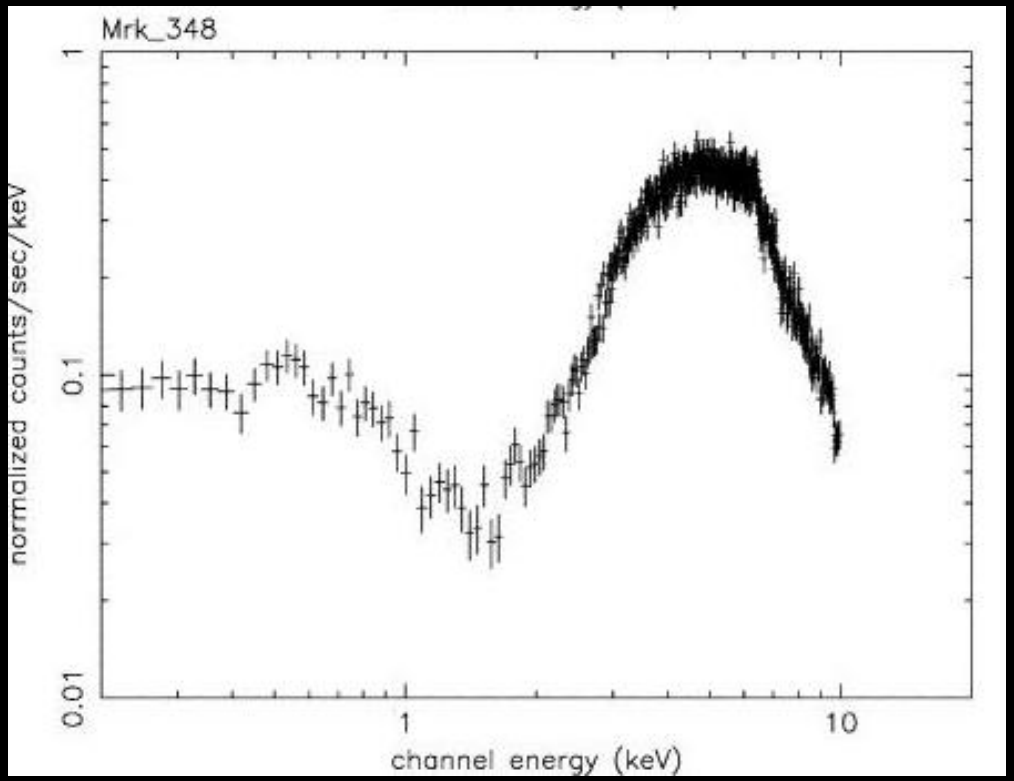
BH growth now and then

Key project 1: comparisons of AGN locally and at z=2

- Local samples (z$\lesssim$0.1)

spectral complexity

absorption, emission, continuum scattering

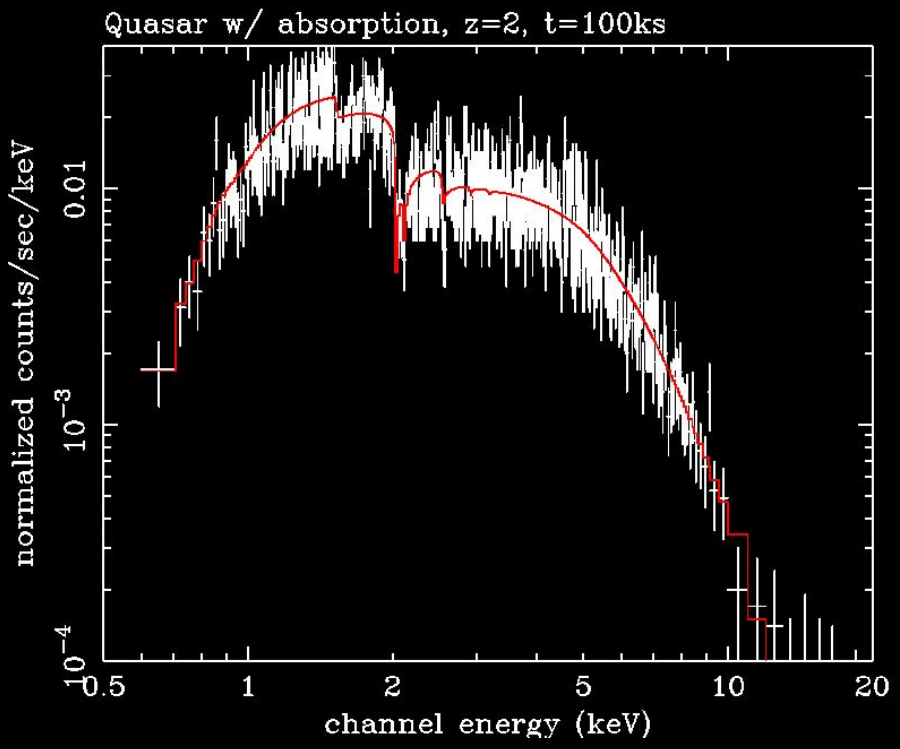


(Awaki et al. 2006)

XMM data modeled as 2 power laws

BH growth now and then

- z=2 L_* quasars



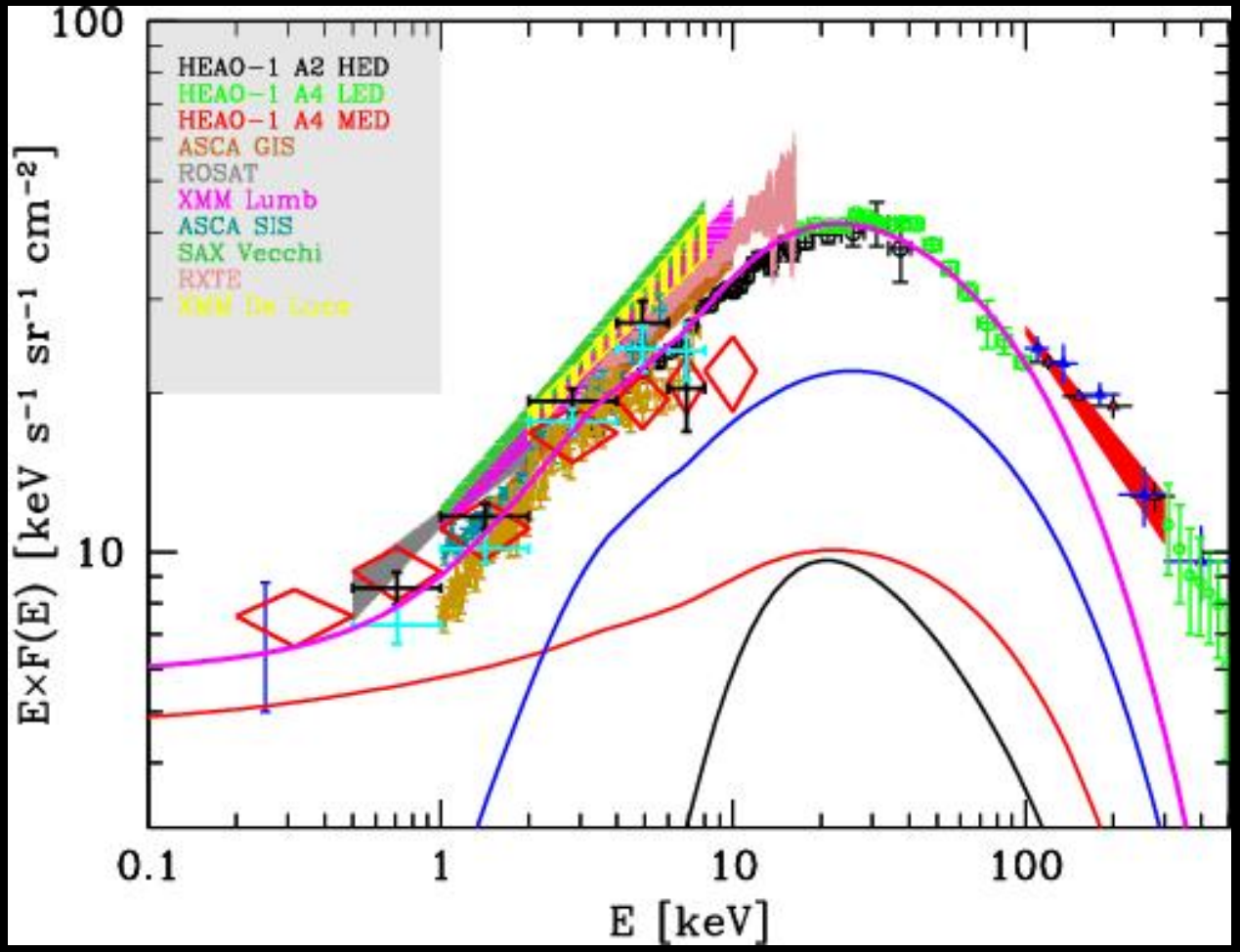
Related science:

probe along luminosity function at given z

variation in accretion rate, outflow?

Buried AGN

Key project 2: Compton thick AGN



(Gilli et al. 2007)

Spectral contribution to cosmic X-ray background

Buried AGN

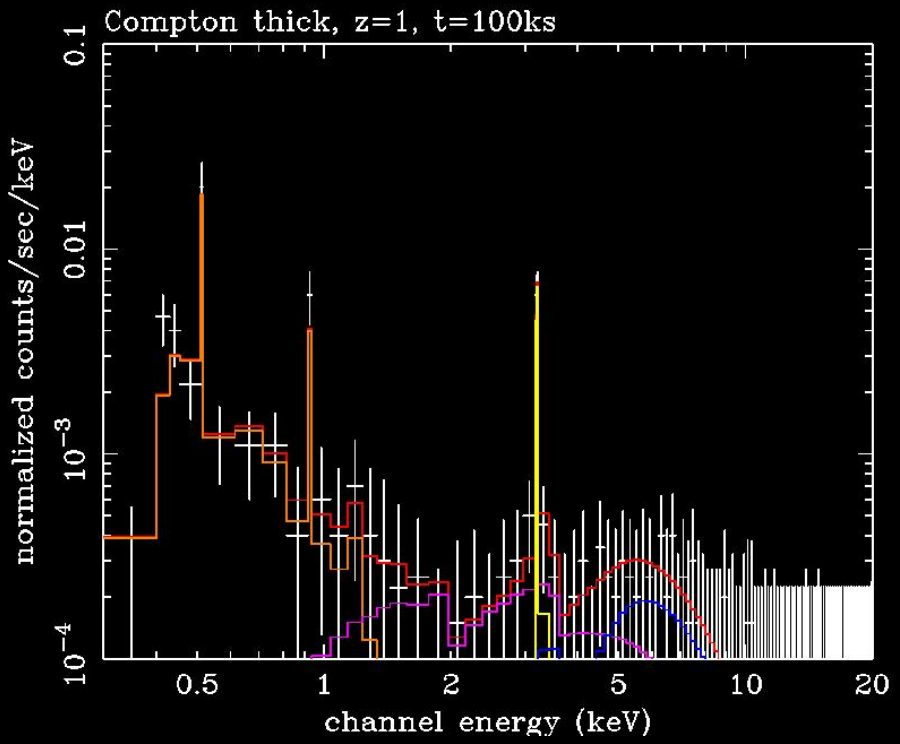
Compton thick AGN are typically hidden

continuum suppressed E $<$ 10keV

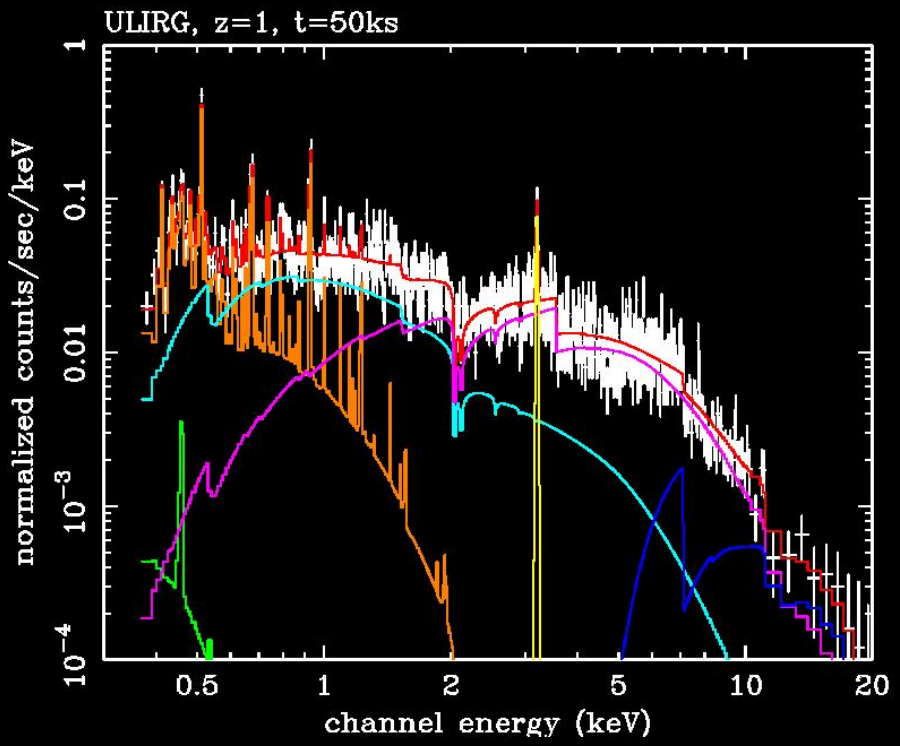
Primarily use XMS spectral diagnostics (Fe K) not HXT

Observe candidates from other surveys

e.g. WISE, NuSTAR



Buried AGN



- Compton reflection
- N_H distribution
  (as a function of z, L_X?)
- Ultraluminous Infrared Galaxies (ULIRGs)
  connection to star formation
  a common phase of quasar evolution?

Single objects of interest

Not science drivers of Con-X, but important examples in the context of BH demographics and growth

- sub-mm galaxies
  extreme ULIRGs; require 1 Msec exposures at z=2.5
- lensed quasars more detailed spectroscopy on distant AGN
  (feedback at high z)

Future plans

- Determine the numbers of sources and the constraints needed to do science identified here
- Refine strategies for selecting samples
  e.g., use Spitzer and Integral results now for future selection from JWST, JDEM, and NuSTAR